

Training Aid: CBRN SCBA User's Guide

December 18, 2006



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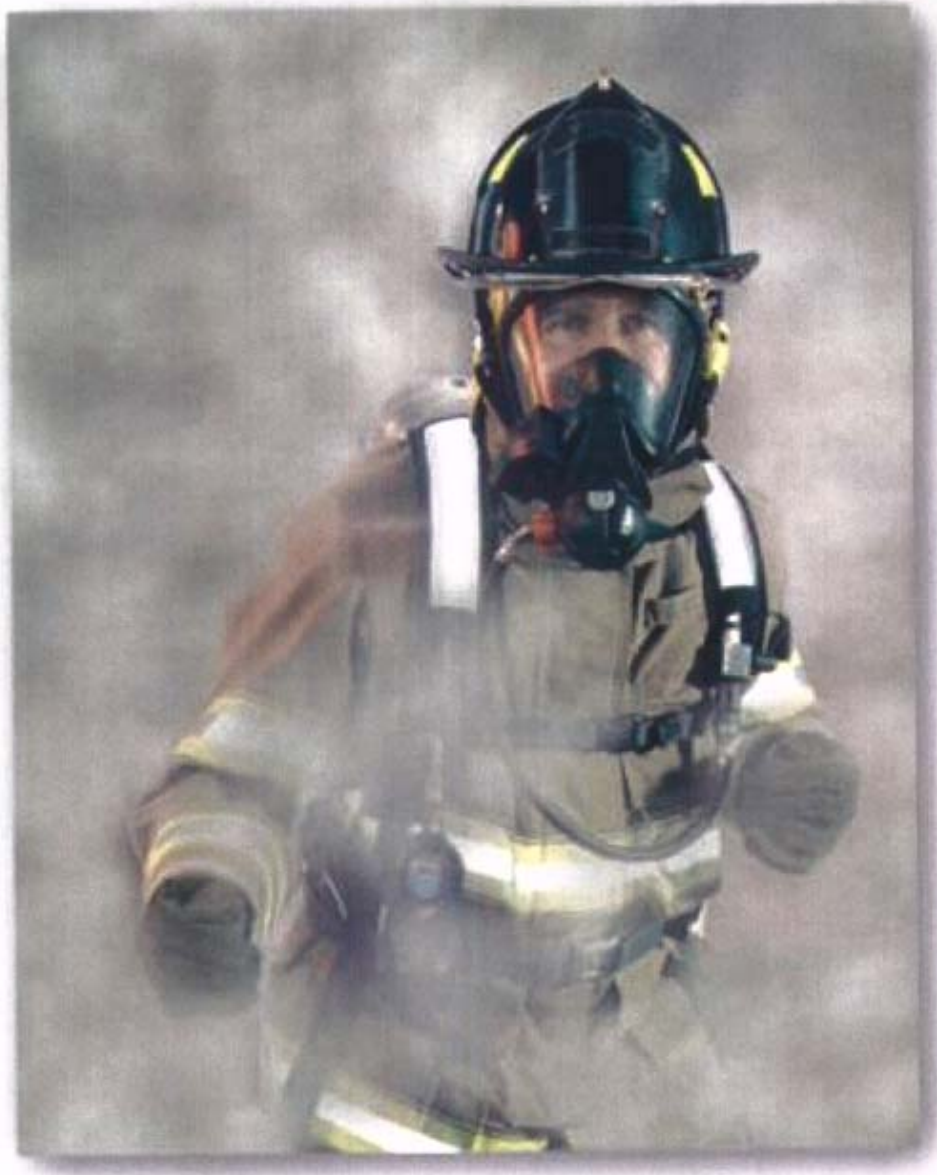


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Fire fighter is wearing CBRN SCBA and full turnout gear in a simulated hazardous atmosphere. Photography is courtesy of Mine Safety Appliances (MSA) and adapted from the original MSA CBRN SCBA marketing flyer depicting the state of the manufacturers' market in 2005.

Front cover photography, from left to right. The cover depicts three distinct workplaces where a NIOSH-certified SCBA with Chemical, Biological, Radiological, and Nuclear (CBRN) protections is currently trained with, worked with, or projected for use: 1) federal responders conducting CBRN terrorism crime scene forensics analysis and hazardous material response, 2) municipal firefighter in a CBRN decontamination corridor, and 3) municipal law enforcement special weapons and tactics officers in a staging area for a bio-terrorism suspect apprehension. Cover photographs are the property of NIOSH and taken by Terrence K. Cloonan, NPPTL, upon invitation from Raymond V. DeMichiei, City of Pittsburgh Deputy Director/WMD Coordinator and Lt. Ed Allen, National Tactical Officer's Association (NTOA), May, 2005.

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OSHA/EPA "Level A" protected responder conducting handheld air monitoring and incident documentation actions in a CBRN training exercise. The responder is in a fully encapsulated Level A - NFPA 1994 Class 1 training ensemble and wearing an open circuit SCBA and a push-to-talk communications device that are not totally visible.

Photograph is courtesy of Terrence K. Cloonan, NPPTL, and Raymond V. DeMichei, Deputy Director/ WMD Coordinator, City of Pittsburgh, PA, May 7, 2005.

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ATTENTION: THIS IS A SNAPSHOT OF A 32-HOUR TRAINING EVENT. IT SHOWS A PHASE OF SCBA TRAINING, WEAPONS FAMILIARIZATION WITH SCBA AND BUTYL GLOVES, THAT LEADS UP TO FULLY ENCAPSULATED LEVEL B PROTECTION FOR CBRN INCIDENT RESPONSE. Six special weapons and tactics (SWAT) law enforcement officers engage stationary targets while wearing SCBA and protective gloves in support of CBRN SCBA acclimatization training. In the forefront responder, notice the cant of the weapon necessary to attain a sufficient chin-to-stock sight picture while wearing the respirator. Photo was taken by Terrence K. Cloonan, NPPTL, based on invitation from LT Ed Allen, NTOA, and SGT Dan Murphy and SGT Don Whitson, of Fort Collins Police Department, Colorado, May 2005.

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Foreword

“Our greatest and gravest concern, however, is WMD in the hands of terrorists.”

National Strategy for Combating Terrorism, President George W. Bush, The Whitehouse, September, 2006.

The purpose of the *Training Aid: CBRN SCBA User's Guide* is to train users and administrators in the best practices of recognizing and using NIOSH-certified SCBA with CBRN protections. The training aid defines a 7-step process that leads an emergency responder through a concise sequence on how to recognize administrative labels that distinguish a NIOSH-certified SCBA with Chemical, Biological, Radiological and Nuclear (CBRN) protections from a non-CBRN SCBA and then use it. Once the non-CBRN SCBA is distinguished from the CBRN SCBA by the user, the training aid then assists the user in locating and understanding the specific NIOSH cautions and limitations related to the respirator. When those are mastered, the step-sequence provides follow-on best practice recommendations on how to apply a service time called a CBRN respirator use life (CRUL), how to recognize SCBA facepiece indicators of concern, and their corrections. It closes with recommendations on a CBRN SCBA decontamination plan and two generic call-out diagrams of common CBRN SCBA parts and components.

Widespread use of the training aid is expected to increase the preparedness and efficacy of CBRN SCBA use during an event, when used in conjunction with an existing respiratory protection program. Properly used, a NIOSH-certified CBRN SCBA protects emergency responders against all respiratory hazards associated with CBRN terrorism contamination, as well as all traditional respiratory hazards created by fire, hazardous industrial materials, illicit drugs, or natural disasters. Stakeholders carrying NIOSH CBRN SCBA approvals sustain the national inventory of available respirators and increase homeland security preparedness by working with NIOSH and its federal partners to increase the availability of federal certified respirator systems for trained users designated to respond to a CBRN terrorism event.

Real time hands-on training with fitted personal protective equipment in pre-event venues is fundamental to successful all hazards response. This CBRN SCBA training aid is a proactive measure to support realistic training of users wearing and donning field deployed CBRN SCBA. Consequently, the training of responders requires durable, simple, and concise training aids. This durable training aid is designed to be easy to use, store, and re-supply. It can fit into an emergency responder's pocket or restructured for formal use in a classroom.

Numerous models of SCBA with CBRN protections have been certified by NIOSH since the first approval was issued on May 31, 2002. Certifications of new types of CBRN SCBA, APR, APER, SCER and PAPR continue parallel to the standards development for next generation CBRN protected respirators.

For more information about NIOSH-certified SCBA with CBRN protections and use guidelines call 1-800-35-NIOSH or visit the website at:

<http://www.cdc.gov/niosh/npptl/topics/respirators/cbrnapproved/scba/>.

Best Regards,

Director,
National Institute for Occupational Safety and Health

Director,
National Personal Protective
Technology Laboratory

Acknowledgements

Terrence K. Cloonan, NPPTL, is the lead author.

NIOSH expresses sincere gratitude to Chuck Urban, NIOSH OD; Bruce Teele, NFPA; Jeffrey O. Stull, International Personnel Protection, Inc.; Rob Pilkington, University of Missouri Fire and Rescue Training Institute; John Eversole, IAFC, IAB and NFPA 472; John Kuhn, MSA; John Morris ISI; Greg Gatlin, Scott Health and Safety; Bob Sell, Draeger USA; and Mike Swofford of Interspiro for their technical review comments and photographic releases.

Mr. Raymond V. DeMichiei of the City of Pittsburgh, Office of the Mayor, Bureau of Fire, Emergency Management Agency/Homeland Security, Mr. Stephen Hughes of the United States Capitol Police, Lt. Ed Allen of the Seminole County Sheriff's Office and the tactical SCBA instructors/users in the National Tactical Officer's Association (NTOA) are deeply appreciated for the invitations to observe and train with the respective responders.

A special thanks to Amanda Ford of EG&G Technical Services, Inc. for graphics support.



Photograph depicts a fire department ladder truck gross decontamination station and responders processing through its high volume-low pressure water spray, prior to continuing on to the technical decontamination stations during a local training exercise. Responders are in Level B ensembles and moving in a 360 degree circle, with extended arms, before leaving the spray. Photo is a video still image made by Mr. Chuck Urban, NIOSH, upon invitation from Raymond V. DeMichiei, Deputy Director/ WMD Coordinator, City of Pittsburgh, PA, May 2005.

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County Sheriff law enforcement emergency response team (ERT) in Level B hostage training, circa 2000. Red smoke simulated a CBRN weapons release. Photograph is courtesy of Terrence K. Cloonan, Scott Health and Safety.

Step 1 LOCATE THE LABELS

Adhesive Labels

Back frame assembly with affixed CDC NIOSH “CBRN agent approved” label, NIOSH abbreviated harness label, and Safety Equipment Institute (SEI) certification label.

The three required adhesive labels consist of: **1** a NIOSH harness assembly label, **2** a SEI label and **3** a NIOSH “CBRN Agent Approved” label. A fourth label is a paper label located in, or as an insert to the respirator manufacturers’ user instructions **4**. The three adhesive labels can be located anywhere on the back frame assembly. NFPA specifies a font size. NIOSH requires the words to be visible and easily read. NIOSH “CBRN Agent Approved” labels are white with black font. All four labels are required for NIOSH certification. Figure 1 below shows a CBRN SCBA back frame assembly with the three regulatory adhesive labels required on the back frame. They are indicated by yellow circles with the numerals 1, 2, and 3. Throughout this user guidance, yellow circles with numbers match information in the text and are used to show specific locations of an adhesive or paper label on the CBRN SCBA.



Figure 1. SCBA back frame and harness assembly depicting the locations of three CBRN SCBA compliance adhesive labels: 1) NIOSH harness label, 2) SEI confirmation label to the existing NFPA 1981 standard in effect at the time of NIOSH approval and 3) NIOSH “CBRN Agent Approved” label. Photo is courtesy of Ken Williams, NIOSH, and Michael L. Swofford, Interspiro Inc, 2002.

Step 2 VERIFY THE LABELS

1 NIOSH Traditional Back Frame and Harness Assembly Label (Figures 2a & 2b).

This label can be any color or font size, but must be readable and affixed to the SCBA back frame. It confirms that the SCBA has met the first tier of CBRN protection certification, the traditional 13F approval process. The label lists the approval numbers, the product name, the time duration, and the working pressure of the SCBA. It also lists the traditional cautions and limitations, in addition to the information identifying the manufacturer of the SCBA. Without this label the first tier of the CBRN protections is not verified. If the label is unreadable or deformed, consult the manufacturer or NIOSH. The next step is to look for the SEI compliance label. It is a label that incorporates the logo of the SEI and identifies the edition of NFPA 1981 compliance. SEI is a private sector certification organization that administers the NFPA certification process to manufacturers meeting the NFPA 1981 standard.

(Admin Note: The number 3 in the yellow circle will be positioned up in the photograph next to the small lower CBRN label. For the purposes of Word software, the 3 cannot be positioned correctly. All digital photography dpi levels are low for the ease of email file transfer.)

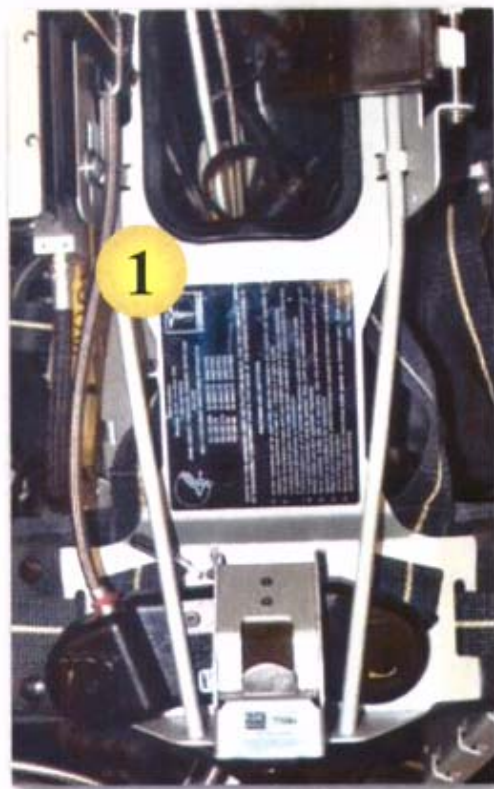


Figure 2b. Harness assembly with general location of large black NIOSH label in the center and the small white CBRN label at the bottom. Photo is courtesy of Terrence J. [redacted], NPPTL/NIOSH and Leslie Murphy, United States Capitol Police (USCP), Washington, DC, January, 2006. Respirator design is courtesy of Scott Health and Safety, 2006.

 <p>INTERSPIRO, INC. 31 BUSINESS PARK DRIVE BRANFORD, CT 06405 PHONE (800) 468-7788</p> <p>SPIROMATIC/SPIROLITE 9030, 9030, 4530, 4515 OPEN-CIRCUIT, PRESSURE DEMAND, ENTRY AND ESCAPE SELF-CONTAINED BREATHING APPARATUS OR COMBINATION SELF-CONTAINED BREATHING APPARATUS AND SUPPLIED AIR RESPIRATOR</p> 			
TC-13F-132	SPIROMATIC/SPIROLITE 4515	30 MINUTE	2216 P.S.I.G.
TC-13F-133	SPIROMATIC/SPIROLITE 4530	30 MINUTE	4500 P.S.I.G.
TC-13F-213	SPIROMATIC/SPIROLITE 9030	45 MINUTE	4500 P.S.I.G.
TC-13F-197	SPIROMATIC/SPIROLITE 9030	60 MINUTE	4500 P.S.I.G.
TC-13F-199	SPIROMATIC/SPIROLITE 9030 W/SUIT VENTILATION	60 MINUTE	4500 P.S.I.G.

CAUTIONS AND LIMITATIONS:
(REFER TO THE APPROVED USER INSTRUCTION MANUAL FOR THE COMPLETE LIST OF SUBASSEMBLY COMPONENT PARTS THAT MAKE UP THE APPROVED ASSEMBLY)

- For the respirator to be used only when the respirator is supplied with respiratory air meeting the requirements of CGA G-1.1 Grade D or higher quality.
- Use only the pressure ranges and hose lengths specified in the user's instructions.
- Certain electrical parts which have not been evaluated as an ignition source in flammable or explosive atmospheres to MS&H/USCP.
- Failure to properly use and maintain this product could result in injury or death.
- All approved respirators shall be selected, fitted, used, and maintained in accordance with MS&H/USCP and other applicable regulations.
- Never substitute, modify, add, or omit parts. Use only exact replacement parts in the configuration as specified by the manufacturer.
- Refer to users instructions, and/or maintenance manuals for information on use and maintenance of these respirators.
- Special or critical users instructions and/or specific job conditions apply. Refer to instruction manual before donning.

Figure 2a. A field use example of a NIOSH traditional back frame and harness assembly label 1 showing traditional NIOSH levels of protection to include model, duration, and pressure rating, per TC-13F-approval number. Courtesy of Interspiro, Inc. 2002.

Step 2 VERIFY THE LABELS

2 SEI Certification Label to NFPA 1981 Standard (Figures 3a & 3b)

This label can be any color and of a specified NFPA font size. It must be readable, affixed to the SCBA with no evidence of destruction, and state appropriate NFPA language. In the figures 3a and 3b below, the figure 3a label tells the user that the SCBA has met the requirements of the *NFPA 1981 Standard on Open-Circuit Self-Contained Breathing Apparatus for the Fire and Emergency Services, 1997 edition*. Without the SEI certification label, the second tier of the NIOSH CBRN protections is not verified. Recognize this label and when it is serviceable, the CBRN SCBA, as a respirator system, has met the voluntary requirements of the NFPA standard and the traditional NIOSH 42CFR Part 84 requirements. The new NFPA 1981 standard (2007 edition) will mandate NIOSH CBRN protections for NFPA 1981 compliant SCBA. Once you locate the SEI label, you must now locate the NIOSH "CBRN Agent Approved" label 3.



Figure 3a. Example of an actual SEI certification label, showing compliance to NFPA 1981 standard (1997 Edition), Label 2. The first CBRN SCBA NIOSH approved was compliant to the 1997 edition. Image courtesy of Interspiro, Inc., 2002.



Figure 3b. SCBA back frame and harness assemblies showing a partial NIOSH label on the upper SCBA and a red SEI label on the reverse side of a like SCBA in the center. An administrative number "182", assigned by the municipality, is on the yellow sticker. Photo is courtesy of Terrence K. Cloonan, PPTL/NIOSH and Steve Hughes, United States Capitol Police (USCP), SCBA staging site, January, 2006. Respirator design is courtesy of Scott.

Step 2 VERIFY THE LABELS

3 NIOSH "CBRN Agent Approved" Labels (Figures 4, 5, 6, and 7)

CBRN SCBA LABEL: New black and white labels tell the user the SCBA has CBRN protections. Verify that the CDC NIOSH CBRN Agent Approved adhesive label is on the SCBA back-frame! If the label is scratched or unreadable, conformation of CBRN protection should be made with the manufacturer or NIOSH.

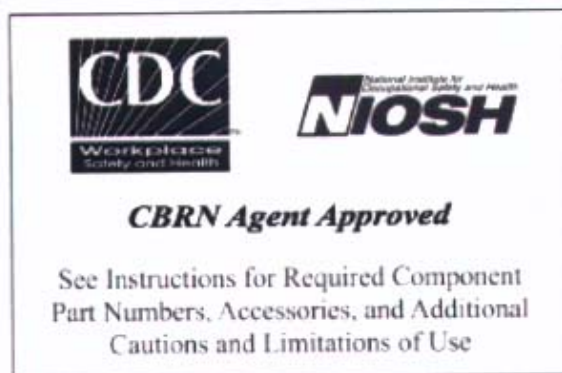


Figure 4. Example of a CDC NIOSH "CBRN Agent Approved" adhesive label 3.

RETROFITTED SCBA TO CBRN PROTECTIONS LABEL. The same style of label may say "Retrofit" if the SCBA was a previously deployed traditional NIOSH approved respirator and SEI certified to NFPA 1981* which was later upgraded to a NIOSH-certified respirator with CBRN protections.

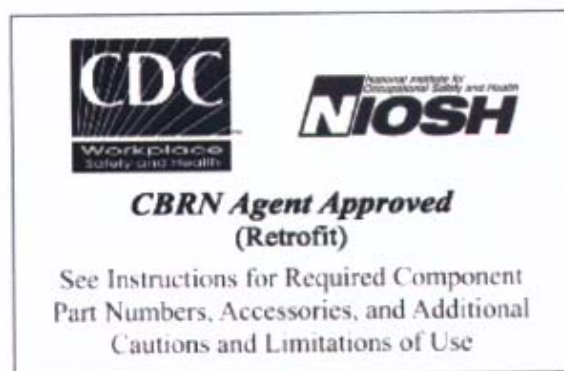


Figure 5. Example of a CDC NIOSH "CBRN Agent Approved (Retrofit)" adhesive label 3.

*SEI Certified SCBA to NFPA 1981 refers to the SCBA demonstrating compliance to the National Fire Protection Association 1981 Standard on Open Circuit, Self-Contained Breathing Apparatus for Fire and Emergency Services, based on the current edition in effect at time of NIOSH –certification to CBRN protections.

Step 2 VERIFY THE LABELS

NEW CBRN SCBA. If the NIOSH-certified SCBA with CBRN protections you are working with was approved after December 5, 2005, the back frame harness assembly NIOSH CBRN Agent Approved label will be identical to Figure 6 below. This label indicates a new respirator and notice it does not have the CDC logo.

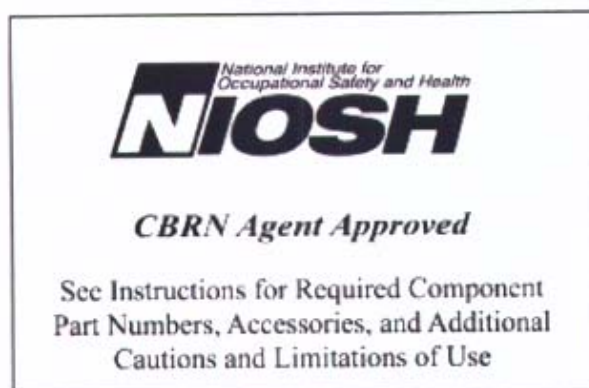


Figure 6. Example of a NIOSH *CBRN Agent Approved* adhesive label, minus the CDC logo, effective December, 2005. 3.

NEW RETROFIT TO CBRN PROTECTIONS. If the field deployed SCBA has been upgraded/retrofitted to a NIOSH-certified respirator with CBRN protections it will carry the decal identified in figure 7. Retrofitting is done by use of a NIOSH-approved retrofit kit that has been installed in accordance with the manufacturer's instructions or installed by the manufacturer. The standard NIOSH logo and additional instructions are also required to be present and readable. See Figure 7 below for exact specifics. A compliant CBRN SCBA can have either style of CDC NIOSH or NIOSH only logos on the "CBRN Agent Approved" or "CBRN Agent Approved (Retrofit)" labels, but not both or an intermixing of logo labels.

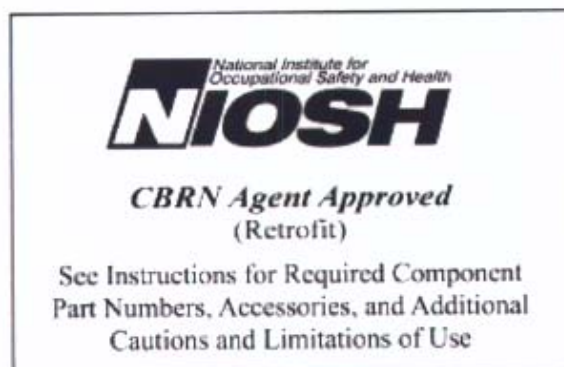


Figure 7. Example of a NIOSH *CBRN Agent Approved (Retrofit)* adhesive label, effective December, 2005. 3.

VERIFY THE LABELS

4 Paper Matrix Style Label-Confirms Part Number NIOSH Approval

In a pre-event posture, locate the paper label. Then verify the SCBA is assembled with the parts listed. Figure 8 is an example of what a paper label looks like. If you cannot read the part numbers on the respirator or label, seek assistance. If you have any doubt that a part number is not NIOSH-certified, consult NIOSH or the manufacturer before use. For CBRN SCBA; the HHS logo, the NIOSH logo, and the NIOSH CBRN Agent Approved label are required to be on the official paper label. All part number information on this paper label shall match the information on CBRN SCBA back frame.

OPEN-CIRCUIT, PRESSURE DEMAND, CANIN, COMPRESSED AIR, SELF-CONTAINED BREATHING APPARATUS

THESE RESPIRATORS ARE APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS:

CONFIGURATION COMPONENTS			APPROVED CONFIGURATIONS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
			A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	
TYPE	PROTECTION	A. TIGHTNESS	A. TIGHTNESS										APPROVED ONLY IN THE FOLLOWING CONFIGURATIONS	

Figure 8. Example of a NIOSH CBRN SCBA matrix-style approval label 4.

Step 3 KNOW THE USER'S INSTRUCTIONS

The Use/User's Instructions (UI) are included with every purchase of a new CBRN SCBA and typically include copyrighted guidance on:

1. Location of NIOSH labels, unique parts labeled "CBRN" by the manufacturer, CBRN cautions and limitations, and recommended training requirements
2. Description of respirator with pre-use, in-use, removal, and cold weather checks
3. Donning and doffing in all conditions
4. Fit-testing, facial hair, and user seal checks
5. Assembly and warranty statements
6. Air cylinder inspections, hydrostatic test requirements, and Grade D air specs
7. Legal and technical cautions, limitations, and warnings plus sanitization and decontamination/disposal guidance
8. Maintenance inspection checklists
9. Replacement parts
10. Regulator function checks and free flow warnings due to underwater submersion.
11. Function of all end-of-service time-indicators (EOSTI) and RIT/UAC connections
12. Function of heads up display (HUD)
13. Inspection of hose integrity for damage and tight hose connections
14. Function of personal alert safety system (PASS)
15. Function of air hatches, compact demand valves, or other specific SCBA air exchange designs related to facepiece regulator technology.
16. Air cylinder and cylinder neck valve assemblies supporting or not supporting interoperability of compatible SCBA breathing air cylinders and back frames
17. Accessories that may increase the ballistic protection of components
18. Conduct of a user seal check without inadvertently applying excessive hand pressure and thus creating a false respirator sealing surface or condition



Photograph depicts a law enforcement team leader conducting a CBRN SCBA facepiece negative pressure user seal check while in a Level B training posture. Picture is courtesy of Terrence K. Cloonan, NPPTL/NIOSH and Mr. Leslie Murphy, United States Capitol Police (USCP), Washington, DC, 2006.

See Appendix A to this training aid, *Component Call-Out – MMR Non-Detachable*, and Appendix B, *Component Call-Out- MMR Detachable*, for generic terminology that identifies common components of a CBRN SCBA.

Step 4 KNOW THE CAUTIONS AND LIMITATIONS

Cautions and Limitations History

The administrative notes section of a paper NIOSH matrix-style approval label (Figure 8) consists of three parts of written information.

The first part is a section entitled 1. *Protection*. It outlines the approved protection acronyms recognized by NIOSH in the formal approval letter. Acronyms such as SC, PD, and CBRN are examples of the official protection acronyms and stand for self-contained (SC), pressure demand (PD), and chemical, biological, radiological and nuclear (CBRN). These are protection ratings and are normally defined as a *type* of protection or a *level* of protection. "Type" refers to the protection against a different contaminant such as a CBRN contaminant. "Level" refers to a different level of protection defined by a change in the type of facepiece or air supply capacity. PD and SC are levels of respirator protection.

The second section is entitled 2. *Cautions and Limitations*. These are traditional cautions and limitations (C&L) that apply to the SCBA when it is used in structural firefighting or hazardous material responses.

The third and final section is 3. *Cautions and Limitations: CBRN*. These are the additional limitations that are mandatory for use in a CBRN response. The three administrative notes sections are NIOSH mandated statements and ideal training topics. Using site-based job hazard analysis, experienced respirator decision logic and available respirator use life factors, coupled with training on adherence to the identified cautions and limitations, workers have a greater probability of not being exposed. As a last resort, PPE may be contaminated but, if it is performing as designed, the worker is not being exposed. Immediately dangerous to life or health (IDLH) concentration values and characterization of the workplace are considered respirator use decision factors for use of any type of NIOSH-certified respirator. If a site is uncharacterized, user should default to maximum protective posture afforded by the use of a NIOSH-certified SCBA with CBRN protections.



Responders in hazard zone transition area. Photograph was taken by Terrence K. Cloonan, NPPTL, upon invitation from Raymond V. DeMichiei, Deputy Director/WMD Coordinator, City of Pittsburgh, PA, May, 2005.

Step 4 KNOW THE CAUTIONS AND LIMITATIONS

CBRN SCBA are Dual Purpose and Rely on Traditional Science

The following cautions and limitations are in Section 2 of the CBRN SCBA matrix-style approval label and apply to traditional fire fighting, other IDLH conditions and, when necessary, CBRN incident use. Alphabetical listing may exclude non-relevant letters.

- “I” Contains electrical parts, which have not been evaluated as an ignition source in flammable or explosive atmospheres by MSHA/NIOSH. **No Intrinsic Safety**
- “J” Failure to properly use and maintain this product could result in injury or death. **Proper Use per the UI**
- “M” All approved respirators shall be selected, fitted, used, and maintained in accordance with MSHA, OSHA, and other applicable regulations. **OSHA Use requirements**
- “N” Never substitute, modify, add, or omit parts. Use only exact replacement parts in the configuration as specified by the manufacturer. **Parts are non-exchangeable- Do not intermix**
- “O” Refer to user instructions (UI), and/or maintenance manuals for information on use and maintenance of these respirators. **Maintenance per UI**
- “S” Special or critical UI and/or specific limitations apply. Refer to UI before donning. **Other Info**

ADMINISTRATORS! Ensure SCBA cylinders are hydrostatic tested in accordance with U.S. DOT requirements. Ensure the cylinder neck valves are tightened to specified torque foot lbs. per the SCBA manufacturer. **Do not over tighten the valves.** Some hydrostatic test completion dates are resin labels with a three figure test code. The code is a month, a unique inspector mark, and the calendar year in two digits. i.e. 7^05 stands for July, ^ = tester, and 05, which means the hydrostatic test was passed in July, 2005. Know the cylinder service life per type of cylinders available.

ATTENTION EMERGENCY RESPONDERS!

Conduct visual inspection of cylinder before use. Protect the cylinder valve stem and handle during change out and use. Decontaminate per UI.



Technical decontamination station depicting a Level A responder with hardhat, being spot decontaminated by a Level B responder under training conditions. Photo is courtesy of Terrence K. Cloonan, NPPTL, Jack Hagerty, NIOSH, and Raymond V. DeMichiei, Deputy Director/WMD Coordinator, City of Pittsburgh, PA, 2005.

Step 4 KNOW THE CAUTIONS AND LIMITATIONS

CBRN SCBA Are Respirators and Their Use Has Limitations!

Responders use several terms to mean a SCBA respirator. Some are interchangeable terms such as breathing apparatus (BA) or "Air-Pak"®. Others may be the first name of the respirator manufacturer or the first name followed by "SCBA". Conversely, the words "gas mask" or "respirator" are understood to mean a negative pressure air-purifying respirator (APR) or a powered-APR (PAPR) and are considered completely separate from the SCBA. Per NIOSH respirator selection logic, both an SCBA and a "gas mask" are respirators, just different classes of respirators. Per 42 CFR Part 84, paragraph 84.2, (aa), a respirator is defined as "any device designed to provide the wearer with respiratory protection against inhalation of a hazardous atmosphere." With the introduction of NIOSH-certified respirators with CBRN protections, the term CBRN respirator or, in this case CBRN SCBA, are now commonly understood.

The following NIOSH cautions and limitations appear in Section 3 of the CBRN SCBA matrix-style approval label (see Figure 8). Along with the traditional limitations just described, all of them apply specifically for use in CBRN environments. **KNOW THEM.**

- "Q"** Use in conjunction with personal protective ensembles that provide appropriate levels of protection against (CBRN agent) dermal hazards. **Use with PPE**
- "R"** Some CBRN agents may not present immediate effects from exposure, but can result in delayed impairment, illness, or death. **Expect delayed effects**
- "T"** Direct contact with CBRN agents requires proper handling of the SCBA after each use and between multiple entries during the same use. Decontamination and disposal procedures must be followed. If contaminated with liquid chemical warfare agents, dispose of the SCBA after decontamination. **Handling is direct contact with any physical state of the agent. Decontaminate ASAP**
- "U"** The respirator should not be used beyond six hours after initial exposure to chemical warfare agents to avoid possibility of continued agent permeation.

CBRN Respirator Use Life (CRUL) = 6 Hours

NOTE 1: For the purposes of this training aid the word **Respirator** is defined in accordance with 42CFR84 and is the entire SCBA respirator; to include facepiece/mask, harness assembly, removable regulator, high pressure and low pressure hose lines, cylinder, and any other authorized component/accessory, such as a cylinder cover.

NOTE 2: Use beyond the six-hour mark in a chemical warfare environment is not suggested and further use could lead to increased risks in safety and health. For example, at the incident + 5 hour mark (I+5) start processing through the decontamination corridors. After technical decontamination is complete, the user should safely doff the CBRN SCBA before the I+6 mark and the administrator/incident commander should ensure the CBRN SCBA hardware is then properly contained and disposed in accordance with local SOP. The existing sampling and monitoring methods that allow users to make a real time agent identification and determination will dictate the CBRN respirator use life timing. A SCBA retrofitted to CBRN has the same 6-hour limitation.

Step 4 KNOW THE CAUTIONS AND LIMITATIONS

CBRN SCBA Use in Level A or B

SCBA encapsulated by a protective ensemble are expected to assume the protective qualities of the suit material until that ensemble is ripped/compromised, or doffed. If the suit is compromised, the respiratory system is then highly susceptible and a NIOSH-certified SCBA with CBRN protections will provide the greatest level of respiratory protection to the user, rather than a non-CBRN SCBA. The use of a non-CBRN hardened SCBA in an OSHA Level A suit should only be used as a last resort, as may be the case when CBRN SCBA are not available. Do not mix-or-match non-CBRN protected parts with CBRN protected parts. Use of a CBRN SCBA in an OSHA/EPA Level A or B protective posture is highly recommended for a CBRN incident response.

If respirator seal problems are detected during use, request evacuation from the CBRN hazard. In the case where evacuation/escape is not immediate and the respirator seal breaks due to slippage, impact, or seal insert crimping- attempt to purge out contaminants by use of the by-pass valve emergency air flow and reseal immediately! If reseal techniques fail, announce "Mayday" open the by-pass valve half way, attempt to locate the breakage, clear the respirator if possible, and conduct a user seal check by running your fingers over the exterior sealing surface to help ensure a uniform sealing interface. While in Level B, do not rely on SCBA over-pressurization air flow to protect you in a CBRN incident. If cool air is felt on the face in a hazardous atmosphere and symptoms are detected, the respirator seal is broke. Clear and re-seal as soon as possible. Develop CBRN SCBA donning time and clearing standards and then practice them. In Level B or C, never wear the head harness of a facepiece over the hooded section of a protective ensemble. The face-to-facepiece seal of the respirator sealing surfaces are adversely affected by any intrusion, especially the hood. The respirator should be the last piece of PPE removed during decontamination. A list of protective ensembles is located on several internet sites, two being the Inter-Agency Board (IAB) and the Responder Knowledge Base (RKB), <http://www.rkb.mipt.org/>. CBRN agents are most likely to expose through the inhalation route and thus a fitted respirator plays a critical role. Inhalation is the most severe route because there is not an immediate way to remove the contamination. In a laboratory, the chemical warfare agents (CWA) of GB and HD liquid and aerosol, at defined concentrations, have demonstrated penetration and permeation effects on the entire SCBA air-pressure boundary, regardless of the point of contamination on the SCBA.



Command and control directives from Level B responders to a Level A responder in hazard zone transition area. Photo is courtesy of Terrence K. Cloonan, NPPTL, and Raymond V. DeMichiei, Deputy Director/ WMD Coordinator, City of Pittsburgh, 2005.

Step 5 APPLY THE CBRN RESPIRATOR USE LIFE (CRUL)

CBRN Respirator Use Life (CRUL) is a unique respirator in-use time value identified in a NIOSH caution and limitation statement (s) designed to provide the highest level of respiratory protection to the breathing zone of individual emergency response workers wearing serviceable and fit tested CBRN respirators. The limitations are determined from rigorous scientific analysis of a respirator's designed breathing zone protective qualities while the respirator is mechanically breathing on a head form in controlled conditions of GB and HD contamination. Actual field CRUL values may vary based on the hazardous concentration gradient encountered, however, the NIOSH laboratory CRUL value is the recommended maximum in-use time a specific type of CBRN respirator can be safely used after being potentially or actually contaminated with aerosolized or liquid chemical warfare agents. Caution and limitation statement "U" specifies that **"the respirator should not be used beyond six hours after initial exposure to chemical warfare agents to avoid possibility of agent permeation."** Limitation "T", last sentence, specifies that **"If contaminated with liquid chemical warfare agents, dispose of the SCBA after decontamination."** Therefore, the CRUL value for a CBRN SCBA is six hours. This means that the CBRN SCBA hardware, when contaminated with a CWA in aerosol or liquid form, has an in-use life of *six continuous hours*, beginning at the time of contamination. Since GB (108 Angstroms in molecular size) and HD are currently considered the worst case aerosol contaminants, biological or radiological particulate contamination is not expected to limit the in-use life of a CBRN SCBA, provided weaponized biological or radiological particulates are not intermixed with chemical warfare agent. The onset of CWA contamination is determined by using qualitative sampling methods in the field and confirmed by laboratory analysis. See the NIOSH chemical agent emergency response cards for specific toxicology data and NIOSH recognized sampling methods. Examples of current NIOSH-certified respirators with CRUL values are SCBA; air-purifying respirators (APR); powered air-purifying respirators (PAPR), air-purifying escape respirators (APER) and self-contained escape respirators (SCER).

- The in-use life time period is ***six continuous hours of use in a contaminated aerosol or liquid chemical warfare environment*** and not a sum of smaller time periods of intermittent use over six, eight, or twelve hours/cumulative time. Intermittent or small time periods of use less than six hours, in contamination, do count toward a total of six hours. Continued use or re-use is not recommended.
- CBRN SCBA must be discarded within six hours after initial contact with any liquid chemical warfare agent, regardless of the duration or frequency of such contact. At the six-hour mark, the entire SCBA is decontaminated and disposed of properly, including the cylinder neck valve assembly. Air cylinder durations will dictate actual disposal decision times. The impact of vapor exposures is situation dependent and agent specific. For non-CBRN SCBA use see UI.
- NIOSH does not recommend "quick charge" of a cylinder or "buddy breathing" between two cylinders in a CBRN environment. Contingency stocks of spare cylinders and replacement CBRN SCBA are recommended. RIT should have CBRN SCBA.



Hot zone evacuation of training casualty by responders wearing Level B and Level C personal protective equipment. Photo is courtesy of Terrence K. Cloonan, NPPTL, and Raymond V. DeMichie, Deputy Director/WMD Coordinator, City of Pittsburgh, 2005.

Step 6 KNOW THESE FACEPIECE INDICATORS OF CONCERN

The facepiece may be donned incorrectly if:

A) The facepiece is fogged over and you are “On-Air”:

Corrections

- If in a hazardous area, immediately escape.
- If in a clean area, doff, and re-don the facepiece. If an ensemble is worn, ensure the suit hood is over top of the respirator head harness and not underneath the head harness. Use anti-fog solution in advance.
- Check that the air cylinder valve is fully turned on.
- Low pressure in cylinder— seek recharge/new fully charged breathing air cylinder
- If fogging still continues while on air, doff in a clean area. Evaluate the proper fit of the respirator sealing surfaces relative to mask size, fit test results, facial hair or hairline infractions, and other factors related to make, model, or comfort traits of the respirator. Re-don.



Figure 9. Generic Mask-Mounted Regulator CBRN SCBA Schematic. Courtesy of MSA, Terrence K. Cloonan, NPPTL, and Marion Molchen, KI, LLC, 2006

B) The second stage regulator or air hatch/switch will not operate correctly or mate properly with the facepiece. If second stage regulator fails in a contaminated atmosphere, turn the purge valve on and escape. In a clean atmosphere:

Corrections

- Disconnect and reconnect the regulator per manufacturer instructions or manually open and close the air hatch/switch. Do not alter the air flow design. NIOSH recognizes that GB and HD permeate silicone material surfaces at a faster rate than other similar material surfaces.
- Ensure the facepiece matches the make and model of the regulator. Use the NIOSH matrix label located during Step 2 to confirm compatible part numbers.
- Ensure locking mechanisms are fully seated, not broken, and debris free. Re-Don.

C) Heads up display (HUD) is not working or you cannot see the HUD:

Corrections

- Doff. Inspect the HUD for damage. Use in accordance with the UI while donned.
- Ensure the batteries are serviceable. Know battery life and replace depleted ones.
- Reconnect the second stage regulator to the facepiece to ensure that it is correctly attached.
- Ensure the electronic connections of the HUD are clean. Re-don.

Step 7 HAVE A DECONTAMINATION PLAN

Decontaminate as soon as possible. The SCBA CRUL six hour in-use life includes the time required to conduct the decontamination process (decon). The time required for disposal of a CBRN SCBA is not in the CRUL. See NIOSH C&L "T" for handling and decontamination guidance.

Additional related decontamination guidance is at the AIHA Guideline 6-2005, *Guideline for the Decontamination of Chemical Protective Clothing and Equipment*, and the OSHA/NIOSH CBRN PPE matrix at <http://www.osha.gov/SLTC/emergencypreparedness/cbrnmatrix/index.html>.

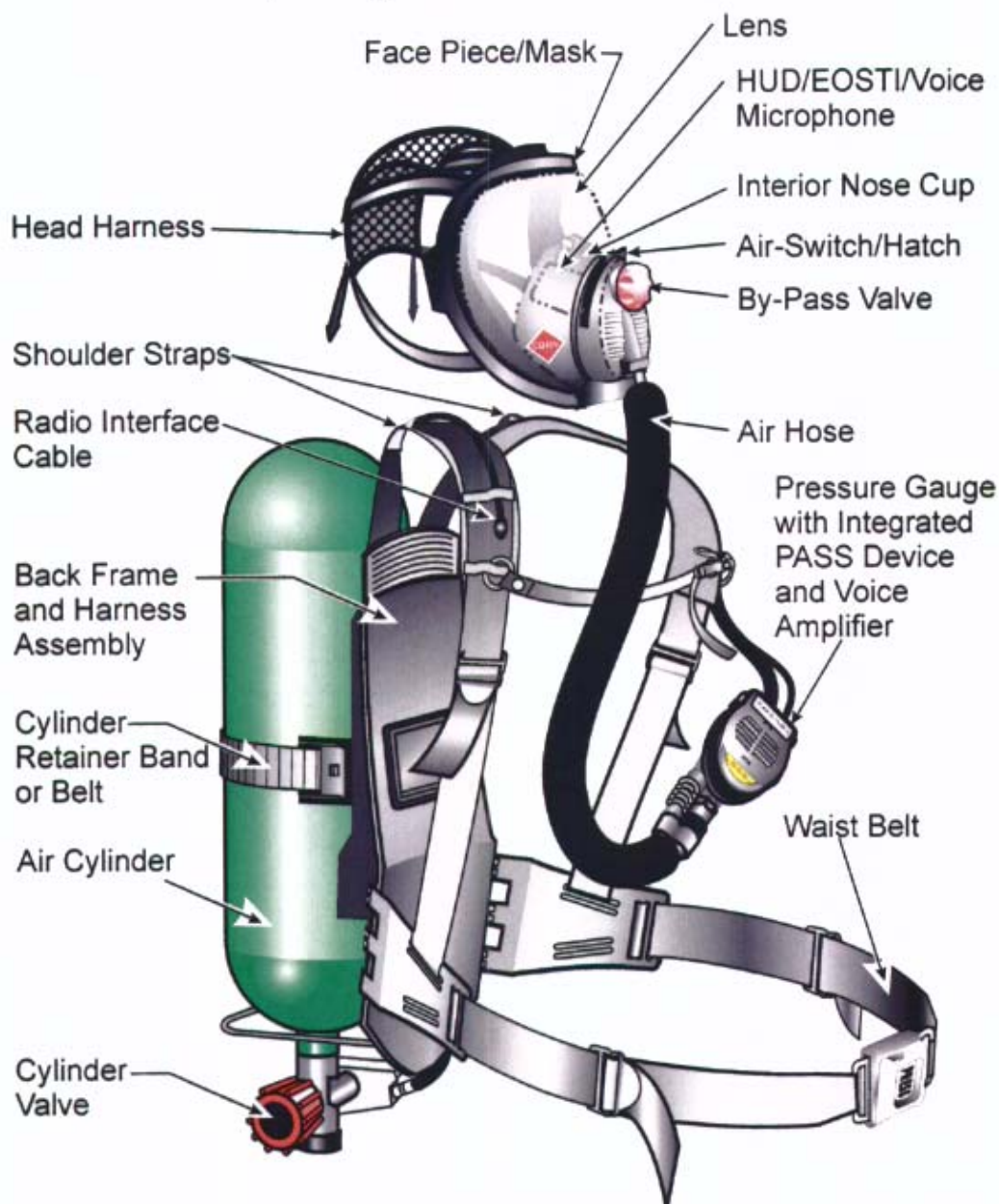
If known or suspected CBRN contamination is present on the SCBA and other PPE, as mission permits conduct emergency or gross wet or dry decon, followed by technical decon, using all available methods and known effectiveness. Ladder pipe/truck decon stations or other field-expedient operations using high volume, low pressure, clean tepid water to reduce surface contamination permeation and off-gassing is recommended. Per the CDC, responders should conduct three separate consecutive water applications per station for liquid contamination. Do not remove contaminated respirator facepiece during the decontamination process until instructed by a qualified recognized responder/leader. Utilize 5% common bleach solution as a supplemental decontamination solution. Determine run-off wash contamination toxicity and implement local prevention measures to preserve and protect responders, the public, municipal infrastructure, and the environment from the anticipated or known effects of CBRN run-off waste products. Certain chemical warfare agents may not be neutralized, and others may be hydrolyzed or diluted while being physically washed off equipment surfaces. Contamination avoidance, sampling, monitoring, mitigation, and decontamination practices should be planned and trained in advance. Ensure all contamination avoidance measures are used. Prevent cross contamination of clean surfaces. Use vapor and liquid contamination control lines to delineate hazard zones in accordance with the prevailing wind direction and ambient temperature(s). If time permits, users should ensure that known or potentially contaminated CBRN SCBA or traditional SCBA are double-bagged in plastic, labeled with the type of contamination, the amount and type of decontamination solution used, and the technique used to conduct gross and technical decontamination. The contamination start time for SCBA and the amount and type of CBRN contamination is also beneficial information, relative to CRUL start time accuracy and disposal timeline management. Repeatable and quantifiable CBRN agent sampling & detection methods are required. Accurate detection of CBRN agents on SCBA is incident dependent and subject to the consensus findings of qualified technicians using recognized quantitative CBRN agent sampling and detection methods and analysis, generating repeatable data, exercising controlled sample custody, and providing conclusive agent identification results to the incident commander or lead federal agency. A decontamination method, specific to the type of CBRN agent contamination, may contribute to the increased efficacy of decontamination operations. Seek specific current guidance concerning medical, logistics, and handling recommendations from the local incident commander, state public health department, or lead federal agency. Visit the CDC links located at <http://www.bt.cdc.gov/agent/sarin/erc107-44-8pr.asp> for guidance.



Photograph depicts fire fighters conducting CBRN gross decontamination training in OSHA Level D turn-out gear and Level B respiratory protection. Photograph courtesy of Terrence K. Cloonan, NPPTL, Jack Hagerty, NIOSH, and Raymond V. DeMichiei, Deputy Director/ WMD Coordinator, City of Pittsburgh, PA, 2005.

Appendix A: Component Call-Out, Non-Detachable

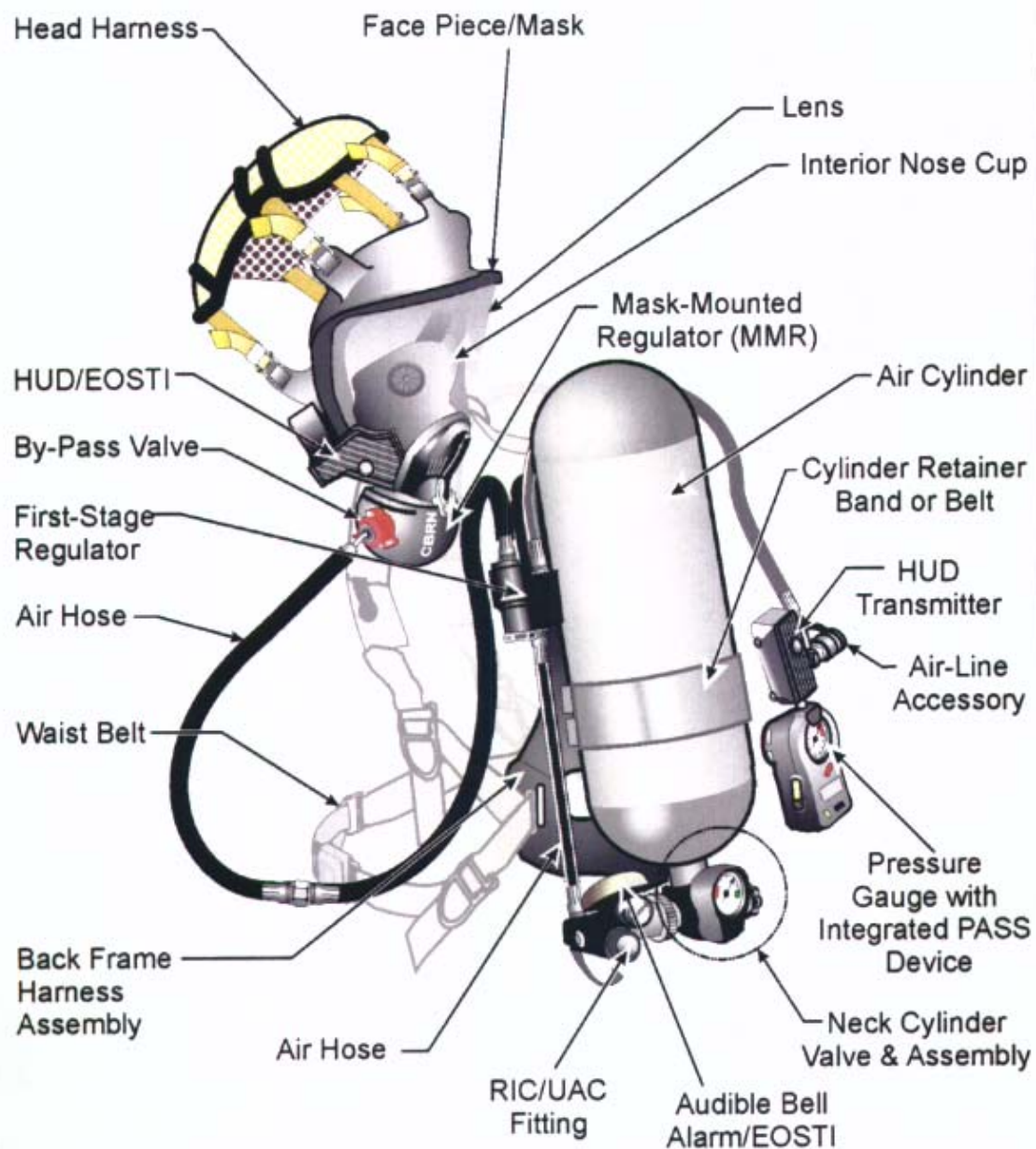
Generic CBRN SCBA with a Mask-Mounted Regulator (MMR), Non-Detachable



Generic drawing courtesy of Terrence K. Cloonan, NPPTL, and Marion Molchen, KI, LLC., 2005.
Drawing adapted from International Safety Instruments, Inc. (ISI), August, 2006.

Appendix B: Component Call-Out, MMR Detachable

NIOSH-Certified SCBA with CBRN Protections Mask-Mounted Regulator (MMR) Version Schematic View 2



Generic drawing courtesy of Terrence K. Cloonan, NPPTL, and Marion Molchen, KI, LLC., July, 2006. Adapted from product manufactured by Mine Safety Appliances (MSA), August, 2006.

Appendix C: References

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<http://www.cdc.gov/niosh/npptl/resources/pressrel/letters/ltr-122801.html> [Date accessed: August 4, 2006]

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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Photograph depicts a two- man law enforcement sniper team in Level B protection during a CBRN barricaded suspect apprehension training exercise. The SCBA are in rip-stop cloth concealment shrouds on the left of the photograph. The photograph was taken by Terrence K. Cloonan, NPPTL, with invitation from LT Ed Allen, NTOA, and LT Jerry Schiager, Fort Collins Police Department, CO, May, 2005.

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